AMENDMENTS TO THE CLAIMS

1-45. (Cancelled)

46. (Previously presented) A method of ablating or changing properties in structure of a non-biologic material by laser induced breakdown with a pulsed laser beam, said method comprising the steps of:

generating a beam of one or more laser pulses characterized by a pulse width approximately equal to or less than a pulse width at which laser induced breakdown becomes essentially accurate at a corresponding fluence;

configuring the beam such that a first area within a spot size of the beam exceeds a breakdown threshold and such that a second area within the spot size does not exceed the breakdown threshold; and

directing said beam to the material;

said essentially accurate breakdown being determinable by a distinct change in breakdown threshold accuracy.

47. (Previously presented) A method of ablation or changing a structural property of a non-biologic material by laser induced breakdown, the material being characterized by a relationship of fluence breakdown threshold versus laser pulse width that exhibits a distinct change in slope at a characteristic pulse width, the method comprising the steps of:

generating a pulsed laser beam comprising a pulse having a pulse width equal to or less than the characteristic pulse width;

configuring the pulsed laser beam such that a first area within a spot size of the pulsed laser beam exceeds the fluence breakdown threshold and such that a second area within the spot size does not exceed the fluence breakdown threshold; and

directing the pulsed laser beam to the non-biologic material.

48. (Previously presented) A method of ablation or changing properties in structure of a non-biologic material with a pulsed laser beam comprising:

generating the pulsed laser beam characterized by a pulse width at a corresponding fluence characterized by a relationship of fluence breakdown threshold versus laser pulse

width having a distinct change in slope, having at least one pulse with a pulse width sufficiently short that the size of the feature created in the material is not substantially limited by thermal diffusion in the material;

configuring an intensity profile of the pulsed laser beam such that a first area within a spot size of the pulsed laser beam exceeds a breakdown threshold and such that a second area within the spot size does not exceed the breakdown threshold; and

directing said beam to the material.

49. (Previously presented) A method of ablation or changing properties in structure of a non-biologic material characterized by a thermal diffusivity, D, with a pulsed laser beam having a pulse width, T, characterized by a pulse width with a relationship of fluence breakdown threshold versus laser pulse width having a distinct change in slope, said method comprising the steps of:

generating the pulsed laser beam with one or more laser pulses having a pulse width sufficiently short at a corresponding fluence so that the thermal diffusion length 1th=Dt1/2 in the material is significantly smaller than the absorption depth (1/a), where a is the absorption coefficient for the radiation;

configuring the pulsed laser beam such that a first area within a spot size of the pulsed laser beam exceeds the fluence breakdown threshold and such that a second area within the spot size does not exceed the fluence breakdown threshold; and

directing said beam to the material.

50. (Previously presented) A method of ablation or changing properties in structure of a non-biologic material characterized by a relationship of fluence breakdown threshold versus laser pulse width in which the fluence breakdown threshold is nearly constant over a pulse width range, the method comprising the steps of:

generating a beam having at least one pulse with a pulse width within the pulse width range;

configuring the beam such that a first area within a spot size of the beam exceeds the fluence breakdown threshold and such that a second area within the spot size does not exceed the fluence breakdown threshold; and

directing said beam to the material.

51. (Previously presented) The method according to any of claims 46-50 wherein the material comprises one or more of an opaque material and a transparent material.

52. (Previously presented) The method according to any of claims 46-50 wherein the material comprises an integrated circuit material.

53. (Previously presented) The method according to claim 52 wherein the material comprises at least two layers and laser induced breakdown substantially affects one layer and not the other.

54. (Previously presented) The method of claim 53 wherein the material comprises a layer of metal on glass and laser induced breakdown is induced in the layer of metal.

55. (Previously presented) The method of any of claims 46-50 wherein laser induced breakdown is induced on the surface of the material.

56. (Previously presented) The method of any of claims 46-50 wherein laser induced breakdown is induced beneath the surface of the material.

57. (Previously presented) The method of any of claims 46-50 comprising irreversibly changing a property of the material.

58. (Previously presented) The method of claim 57 in which the step of irreversibly changing includes one or more of melting and vaporization.

59. (Previously presented) The method of claim 56 comprising irreversibly changing a property of the material.

60. (Previously presented) The method of claim 59 in which the step of irreversibly changing includes one or more of melting and vaporization.

61. (Previously presented) The method of claim 56 in which laser induced breakdown causes thermal-physical changes in state leading to an irreversible change in the material.

62. (Previously presented) The method of claim 55 in which the thermal-physical changes in state include one or more of melting and vaporization.

63. (Previously presented) The method of any of claims 46-50 in which laser induced breakdown includes changes caused by one or more of ionization, free electron multiplication, dielectric breakdown, plasma formation, and vaporization.

64. (Previously presented) The method according to any of claims 46-50 comprising generating a short optical pulse having a predetermined duration; stretching such optical pulse in time; amplifying such time-stretched optical pulse, and recompressing such amplified pulse to a pulse width.

65. (Previously presented) The method according to any of claims 46-50 comprising scanning the beam along a predetermined path along the surface of the material.

66. (Previously presented) The method according to any of claims 46-50 comprising scanning the beam along a predetermined path beneath the surface of the material.

67. (Previously presented) The method according to any of claims 46-50 comprising scanning the beam along a predetermined path beneath the surface of the material to induce laser induced breakdown therein to a depth smaller than the Rayleigh range.

68. (Previously presented) The method according to any of claims 46-50 comprising laser induced breakdown of a material used in one of micromachining, integrated circuit manufacture and encoding data in data storage media.

69. (Previously presented) The method according to any of claims 46-50 comprising laser induced breakdown in a spot without adversely affecting peripheral areas adjacent to the spot.

70. (Previously presented) The method according to any of claims 46-50 wherein the beam comprises one or more pulses with pulse width in the range of 10 femtoseconds to 10 picoseconds.

71. (Previously presented) The method according to any of claims 46-50 wherein the beam comprises one or more pulses with pulse energy in the range of 1 picojoule to 1 joule.

72. (Previously presented) The method according to any of claims 46-50 wherein the repetition rate of the beam is between one pulse per second and 100 million pulses per second.

73. (Previously presented) The method according to any of claims 46-50 wherein the beam comprises one or more pulses with a central wavelength selected from at least one of the following ranges: 100 nm to 200 nm, 200 nm to 300 nm, 300 nm to 700 nm, 700 nm to 1000 nm, 1000 nm to 1100 nm, 1100 nm to 1400 nm, 1400 nm to 1600 nm, 1600 nm to 2000 nm.

74. (Previously presented) The method according to claim 67 wherein the beam comprises one or more pulses, each having a pulse width in the range of 10 femtoseconds to 10 picoseconds.

75. (Previously presented) The method according to claim 67 wherein the beam comprises one or more pulses, each having a pulse energy in the range of 1 picojoule to 1 joule.

76. (Previously presented) The method according to claim 67 wherein the repetition rate of the beam is between one pulse per second and 100 million pulses per second.

77. (Previously presented) The method according to claim 67 wherein the beam comprises one or more pulses with a central wavelength selected from at least one of the following ranges: 100 nm to 200 nm, 200 nm to 300 nm, 300 nm to 700 nm, 700 nm to 1000 nm, 1000 nm to 1100 nm, 1100 nm to 1400 nm, 1400 nm to 1600 nm, 1600 nm to 2000 nm.

78. (Previously presented) A method for laser induced breakdown of a non-biological opaque or transparent material with a pulsed laser beam, the material being

characterized by a relationship of fluence threshold at which breakdown occurs versus laser pulse width that exhibits a distinct change in slope at a characteristic laser pulse width, said method comprising the steps of:

generating at least one laser pulse which has a pulse width equal to or less than said characteristic laser pulse width at a corresponding fluence;

configuring the pulsed laser beam such that a first area within a spot size of the pulsed laser beam exceeds the fluence threshold and such that a second area within the spot size does not exceed the fluence threshold; and

directing said pulse to a point at or beneath the surface of the opaque or transparent material.

79. (Previously presented) A method for laser induced breakdown of a metal layer on a glass substrate with a pulsed laser beam, the metal being characterized by a relationship of fluence threshold at which breakdown occurs versus laser pulse width that exhibits a distinct change in slope at a characteristic laser pulse width, said method comprising the steps of:

generating at least one laser pulse which has a pulse width equal to or less than said characteristic laser pulse width;

configuring the pulsed laser beam such that a first area within a spot size of the pulsed laser beam exceeds the fluence threshold and such that a second area within the spot size does not exceed the fluence threshold; and

directing said pulse to a point at or beneath the surface of the metal.

80. (Previously presented) A method for laser induced breakdown of a first layer of non-biologic material adjacent a second layer of non biological material with a pulsed laser beam, without substantially affecting the second layer, the first layer being characterized by a relationship of fluence threshold at which breakdown occurs versus laser pulse width that exhibits a distinct change in slope at a characteristic laser pulse width, said method comprising the steps of:

generating at least one laser pulse which has a pulse width equal to or less than said characteristic laser pulse width;

configuring the pulsed laser beam such that a first area within a spot size of the pulsed laser beam exceeds the fluence threshold and such that a second area within the spot size does not exceed the fluence threshold; and

directing said pulse to a point at or beneath the surface of the first layer.

81. (Previously presented) A method of ablating or changing properties in structure of a non-biologic material by laser induced breakdown with a pulsed laser beam, said method comprising the steps of:

generating a beam of one or more laser pulses characterized by a pulse width with a relationship of fluence breakdown threshold versus laser pulse width having a distinct change in slope, having a pulse width approximately equal to or less than a pulse width at which laser induced breakdown becomes essentially accurate;

directing said beam to the material; and

scanning the beam along a predetermined path beneath the surface of the material.

82. (Previously presented) The method according to claim 81 wherein the beam comprises one or more pulses with pulse width in the range of 10 femtoseconds to 10 picoseconds.

83. (Previously presented) The method according to claim 81 wherein the beam comprises one or more pulses with pulse energy in the range of 1 picojoule to 1 joule.

84. (Previously presented) The method according to claim 81 wherein the repetition rate is between one pulse per second and 100 million pulses per second.

85. (Previously presented) The method according to claim 81 wherein the beam comprises one or more pulses with a central wavelength selected from at least one of the

following ranges: 100 nm to 200 nm, 200 nm to 300 nm, 300 nm to 700 nm, 700 nm to 1000 nm, 1000 nm to 1100 nm, 1100 nm to 1400 nm, 1400 nm to 1600 nm, 1600 nm to 2000 nm.

86. (Previously presented) A method of ablation or changing a structural property of a non-biologic material by laser induced breakdown, the material being characterized by a relationship of fluence breakdown threshold versus laser pulse width that exhibits a distinct change in slope at a characteristic pulse width, the method comprising the steps of:

generating a pulsed laser beam comprising a pulse having a pulse width equal to or less than the characteristic pulse width;

directing the pulsed laser beam to the non-biologic material; and

scanning the beam along a predetermined path beneath the surface of the material.

87. (Previously presented) The method according to claim 86 wherein the beam comprises one or more pulses with pulse width in the range of 10 femtoseconds to 10 picoseconds.

88. (Previously presented) The method according to claim 86 wherein the beam comprises one or more pulses with pulse energy in the range of 1 picojoule to 1 joule.

89. (Previously presented) The method according to claim 86 wherein the repetition rate of the beam is between one pulse per second and 100 million pulses per second.

90. (Previously presented) The method according to claim 86 wherein the beam comprises one or more pulses with a central wavelength selected from at least one of the following ranges: 100 nm to 200 nm, 200 nm to 300 nm, 300 nm to 700 nm, 700 nm to 1000 nm, 1000 nm to 1100 nm, 1100 nm to 1400 nm, 1400 nm to 1600 nm, 1600 nm to 2000 nm.

91. (Previously presented) A method of ablation or changing properties in structure of a non-biologic material with a pulsed laser beam comprising:

generating the pulsed laser beam characterized by a pulse width with a relationship of fluence breakdown threshold versus laser pulse width having a distinct change in slope, having at least one pulse with a pulse width sufficiently short that the size of the feature created in the material is not substantially limited by thermal diffusion in the material;

directing the pulsed laser beam to the material; and

scanning the pulsed laser beam along a predetermined path beneath the surface of the material.

92. (Previously presented) The method according to claim 91 wherein the beam comprises one or more pulses with pulse width in the range of 10 femtoseconds to 10 picoseconds.

93. (Previously presented) The method according to claim 91 wherein the beam comprises one or more pulses with pulse energy in the range of 1 picojoule to 1 joule.

94. (Previously presented) The method according to claim 91 wherein the repetition rate is between one pulse per second and 100 million pulses per second.

95. (Previously presented) The method according to claim 91 wherein the beam comprises one or more pulses with a central wavelength selected from at least one of the following ranges: 100 nm to 200 nm. 200 nm to 300 nm, 300 nm to 700 nm, 700 nm to 1000 nm, 1000 nm to 1100 nm, 1100 nm to 1400 nm, 1400 nm to 1600 nm, 1600 nm to 2000 nm.

96. (Previously presented) A method of ablation or changing properties in structure of a non-biologic material characterized by a thermal diffusivity, D, with a pulsed laser beam having a pulse width, T, characterized by a pulse width with a relationship of fluence breakdown threshold versus laser pulse width having a distinct change in slope, said method comprising:

generating the pulsed laser beam with one or more laser pulses having a pulse width sufficiently short so that the thermal diffusion length 1th=Dt1/2 in the material is significantly smaller than the absorption depth (1/a), where a is the absorption coefficient for the radiation;

directing the pulsed laser beam to the material; and

scanning the pulsed laser beam along a predetermined path beneath the surface of the material.

97. (Previously presented) The method according to claim 96 wherein the beam comprises one or more pulses with pulse width in the range of 10 femtoseconds to 10 picoseconds.

98. (Previously presented) The method according to claim 96 wherein the beam comprises one or more pulses with pulse energy in the range of 1 picojoule to 1 joule.

99. (Previously presented) The method according to claim 96 wherein the repetition rate of the beam is between one pulse per second and 100 million pulses per second.

100. (Currently amended) The method according to claim 96 wherein the beam comprises one or more pulses with a central wavelength selected from at least one of the following ranges: 100 nm to 200 nm, 200 nm to 300 nm, 300 nm to_700 nm, 700 nm to 1000 nm, 1000 nm to 1100 nm, 1100 nm to 1400 nm, 1400 nm to 1600 nm, 1600 nm to 2000 nm.

101. (Previously presented) A method of ablation or changing properties in structure of a non-biologic material characterized by a relationship of fluence breakdown threshold versus laser pulse width in which the fluence breakdown threshold is nearly constant over a pulse width range, the method comprising the steps of:

generating a beam having at least one pulse with a pulse width within the pulse width range;

configuring the beam such that a first area within a spot size of the beam exceeds the fluence breakdown threshold and such that a second area within the spot size does not exceed the fluence breakdown threshold;

directing the beam to the material; and

scanning the beam along a predetermined path beneath the surface of the material.

102. (Previously presented) The method according to claim 101 wherein the beam comprises one or more pulses with pulse width in the range of 10 femtoseconds to 10 picoseconds.

103. (Previously presented) The method according to claim 101 wherein the beam comprises one or more pulses with pulse energy in the range of 1 picojoule to 1 joule.

104. (Previously presented) The method according to claim 101 wherein the repetition rate of the beam is between one pulse per second and 100 million pulses per second.

105. (Previously presented) The method according to claim 101 wherein the beam comprises one or more pulses with a central wavelength selected from at least one of the following ranges: 100 nm to 200 nm, 200 nm to 300 nm, 300 nm to 700 nm, 700 nm to 1000 nm, 1000 nm to 1100 nm, 1100 nm to 1400 nm, 1400 nm to 1600 nm, 1600 nm to 2000 nm.